INTERNATIONAL STANDARD

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Rubber and plastics hoses — Assessment of ozone resistance under dynamic conditions

Tuyaux en caoutchouc et en plastique — Évaluation de la résistance à l'ozone dans des conditions dynamiques

Reference number
ISO 10960:1994(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10960 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

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Rubber and plastics hoses — Assessment of ozone resistance under dynamic conditions

1 Scope

This International Standard specifies a method of assessing the resistance of hoses to the deleterious effects of atmospheric ozone under dynamic conditions. It is applicable to hoses with bore diameters up to and including 25 mm.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 471:—[1], *Rubber — Times, temperatures and humidities for conditioning and testing.*

ISO 1431-1:1989, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static strain test.*

3 Principle

The cover of a hose in a crescent position during reverse bending is exposed to ozone and examined periodically for cracking.

4 Apparatus

4.1 Ozone cabinet, with apparatus for generating ozone and monitoring and controlling the ozone concentration as described in ISO 1431-1.

4.2 Test piece holder, as shown in figure 1, with means of carrying out flexing at the required frequency.

Details given in ISO 1431-1:1989, subclause 5.6, shall be followed.

All apparatus placed in the test cabinet shall be made from materials which do not absorb or decompose ozone.

5 Test pieces

5.1 Type of test piece

The test piece shall consist of a hose sample with a free length L calculated from the formula

$$L = 20 \times d$$

where d is the outside diameter of the hose under test.

5.2 Number of test pieces

Two test pieces shall be tested.

6 Conditioning of test pieces

No test shall be carried out within 24 h of manufacture.

1) To be published. (Revision of ISO 471:1983 and ISO 1826:1981).

For evaluations which are intended to be comparable, the tests shall, as far as possible, be carried out after the same time interval after manufacture. ISO 471 shall be followed for time between sample manufacture and testing.

The test pieces, mounted as described in 8.1, shall be conditioned for 48 h in a substantially ozone-free atmosphere at standard temperature (see ISO 471), in darkness or subdued light.

7 Test conditions

Unless other conditions are specified in the relevant hose specification, the test pieces shall be exposed in the ozone cabinet to an ozone concentration of (50 ± 5) parts per hundred million (pphm) by volume at 40 °C ± 2 °C for $(72\ ^{0}_{-2})$ h.

NOTE 1 It has been found that differences in atmospheric pressure can influence ozone cracking when test pieces are exposed to constant ozone concentrations expressed in parts per hundred million. This effect may be taken into account by expressing the ozone content in the ozonized air in terms of partial pressure, i.e. in millipascals, and making comparisons at constant ozone partial pressure. At standard conditions of atmospheric pressure and temperature (101 kPa, 273 K), a concentration of 1 pphm is equivalent to a partial pressure of 1,01 mPa.

8 Procedure

8.1 Mount the test piece as shown in figure 1 and place it in the ozone cabinet.

8.2 Carry out flexing at a frequency of 0,3 Hz ± 0,03 Hz and in the test conditions as described in clause 7.

The maximum travel of the piston shall be such that the distance from the lower edge of the piston to the ends of the hose is five times the outside diameter of the hose ± 2 mm (distance B in figure 1). During the return stroke, the piston shall return to a position where the hose is completely unloaded.

8.3 Test pieces may be examined after periods of exposure of 2 h, 4 h, 24 h, 48 h and 72 h, whilst still mounted in the test apparatus, under × 2 magnification, ignoring the area adjacent to the fixing point. If cracks are discovered, record their nature and the time at which they were first observed.

9 Test report

The test report shall include the following information:

a) a reference to this International Standard;

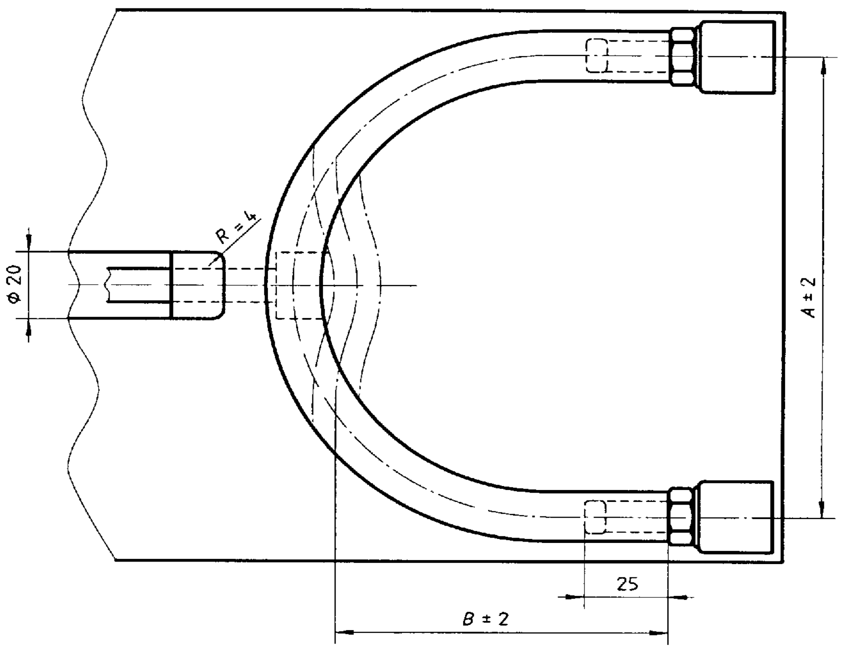
b) all details necessary for the identification of the hose tested;

c) details of the test conditions, i.e. ozone concentration, temperature and exposure period;

d) whether cracks were observed and, if so, their nature and the time the cracks were observed;

e) the date of the test.

Dimensions in millimetres



$A = 10d$

$B = 5d$

where d is the outside diameter of the hose under test

R = radius of curvature of piston end

Figure 1 — Mounted test piece

ICS 23.040.70

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